

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. **(Previously Presented)** A process for producing synthetic quartz glass, comprising: feeding oxygen gas, hydrogen gas, and a silica-forming reactant gas from a burner to a reaction zone, flame hydrolyzing the silica-forming reactant gas in the reaction zone to form fine particles of silica, depositing the silica particles on a rotatable substrate in the reaction zone to form a porous silica matrix wherein during formation of the porous silica matrix, the silica matrix and the flame of reactant gas from the burner are oriented to define an angle of 90° to 110° between their respective center axes so that the porous silica matrix has a density of 0.1 to 1.0 g/cm³ with its distribution within 0.1 g/cm³, and heating and vitrifying the porous silica matrix in a fluorine compound gas-containing atmosphere to form a fluorine-containing synthetic quartz glass.
2. **(Original)** The process of claim 1 wherein a fluorine compound gas is also fed from the burner to the reaction zone along with the silica-forming reactant gas.
3. **(Previously Presented)** The process of claim 1, further comprising heat treating the fluorine-containing synthetic quartz glass in a hydrogen gas-containing atmosphere.
4. **(Withdrawn)** A synthetic quartz glass produced by the process of claim 1, which quartz glass has a hydroxyl group concentration of up to 10 ppm with its distribution

within 1 ppm and a fluorine atom concentration of at least 500 ppm with its distribution within 500 ppm.

5. **(Withdrawn)** The synthetic quartz glass of claim 4 which has a refractive index distribution of up to 5×10^{-4} to light having a wavelength of 633 nm.

6. **(Withdrawn)** A quartz glass substrate for photomasks, made of the synthetic quartz glass of claim 4 which has a birefringence of up to 10 nm/cm to light having a wavelength of 633 nm.

7. **(Previously Presented)** A process according to claim 1, wherein the silica-forming reactant gas is silicon tetrachloride or an alkoxysilane.

8. **(Currently Amended)** A process according to claim 8 7, wherein the alkoxysilane is tetramethoxysilane.

9. **(Previously Presented)** A process according to claim 2, wherein the fluorine compound is SiF_4 , CHF_3 , or CF_4 .

10. **(Previously Presented)** A process according to claim 1, wherein the fluorine compound gas containing atmosphere comprises a fluorine compound gas and an inert gas.

11. (Previously Presented) A process according to claim 10, wherein the inert gas is helium or argon.

12. (Previously Presented) A process according to claim 3, wherein the hydrogen gas-containing atmosphere comprises helium or argon.

13. (Previously Presented) A process according to claim 3, wherein the hydrogen gas-containing atmosphere comprises 1-3% by volume hydrogen.

14. (Previously Presented) A process for producing synthetic quartz glass, comprising:

forming a porous silica matrix by orientating the porous silica matrix and a flame of a reactant gas from a burner to define an angle of 90° to 110° between their respective center axes so that the porous silica matrix has a density of 0.1 to 1.0 g/cm³ with its distribution within 0.1 g/cm³.

15. (Currently Amended) A process for producing synthetic quartz glass according to claim 1, wherein the porous silica matrix has a cylindrical form.